

INSG - May 2007

Nickel

The Bedevilled Metal

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Heinz H. Pariser Alloy Metals
& Steel Market Research

Xanten / Germany

- Stainless Steel & Nickel –
A Long Friendship Coming to an End ?
- Nickel & Other First Use Segments
- High Nickel Prices are the Death of
High Nickel Prices
- Cui Bono ?
- Conclusion

Global First Use of Nickel – 2006

(Preliminary)

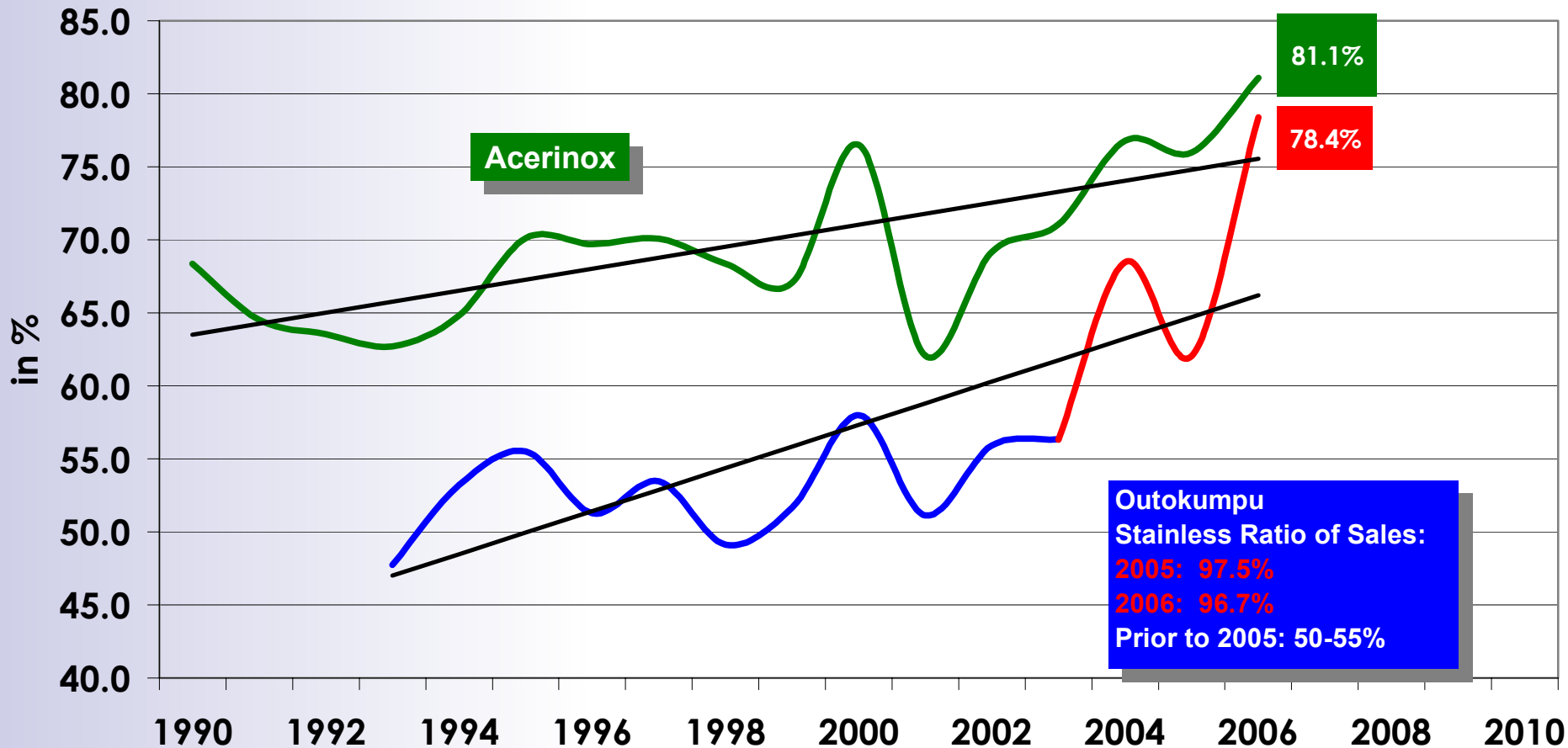
High Substitution Risk

	AL IND. Alloy	MANUFACTURING IND. In base	FOUNDRY	OTHER	TOTAL
	in '000 t				
America	16.5	4.1	5.3	13.8	187.6
European Union	25.0	6.1	13.1	13.5	443.0
Other Europe	8.6	0.0	8.6	3.6	43.5
Japan	39.9	2.9	4.0	12.7	188.0
China	16.0	3.0	6.0	16.8	248.8
Other Asia	9.5	2.3	5.9	10.8	230.6
Other W. World	4.3	0.0	5.1	5.7	48.6
Total	119.8	18.5	48.0	76.8	1,390.1
Structure in %	8.6	1.3	3.5	5.5	100.0

Stainless Steel & Nickel

A Long Friendship Coming to an End ?

Proportion of Raw Material Cost in Stainless Steel Making 1990-2006



Analysis Outokumpu 2006

Raw Material Input

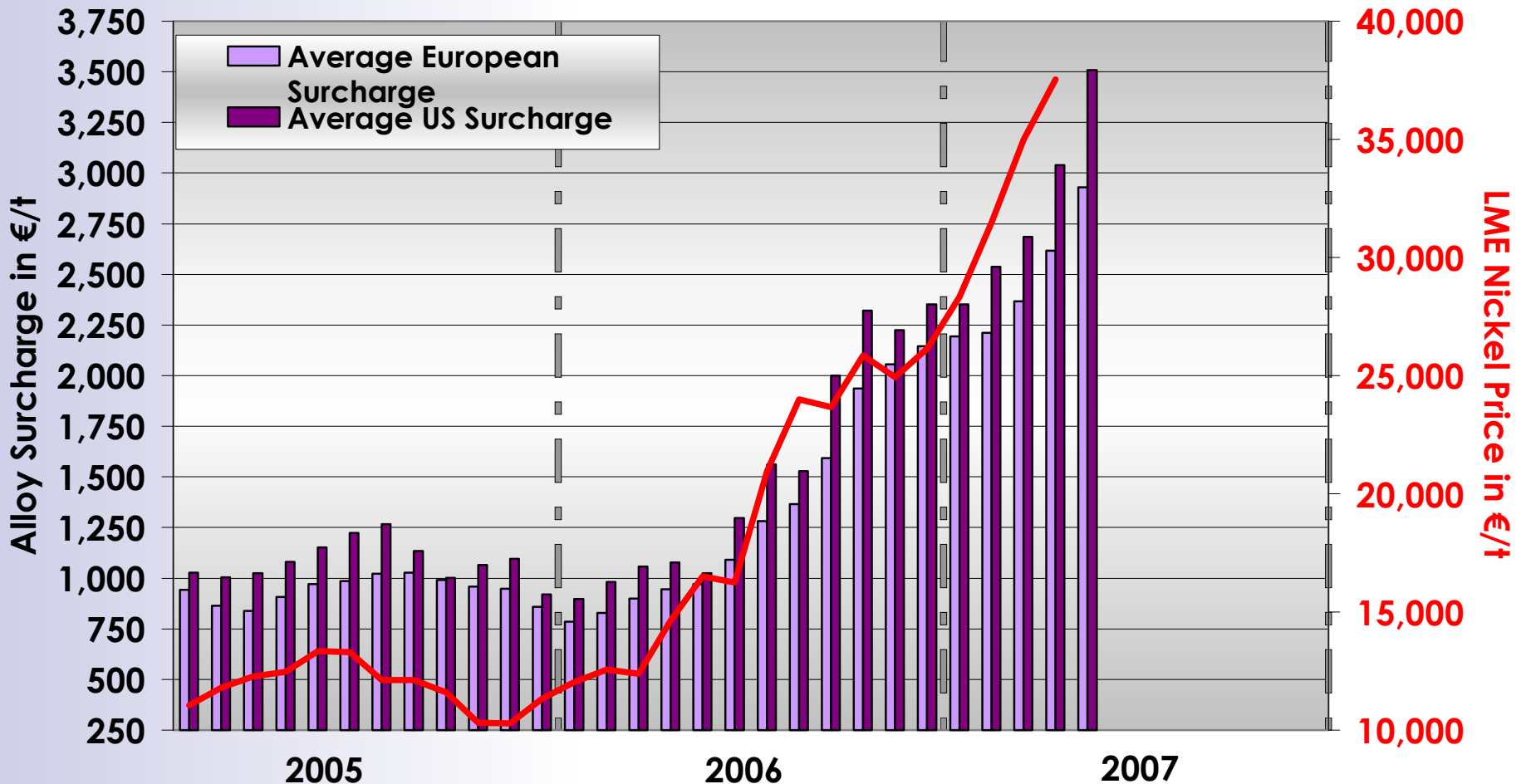
	Structure in %		Analysis				
	By Volume in %	By Value	in '000 t	in Mill €	Average Price €/t	Reference Price	Remarks
Nickel Primary	3	29	60	1,150	19,205	19,325	LME 3M
Nickel in Scrap	5	40	89	1,591	17,891		6.8 % Discount
Subtotal	8	68	149	2,741	18,420		
Chrome Primary	8	5	151	180	1,197	0.54	Internal Supply
Chrome in Scrap	9	5	160	180	1,129	0.51	6.7 % Discount
Subtotal	17	9	310	361	1,162		
Molybdenum Primary	0	9	7	361	49,686		
Molybdenum in Scrap	0	5	5	196	36,068		27.7 % Discount
Subtotal	1	14	13	557	43,850		
Iron in Alloys	10	1	176	36	205		
Iron in Scrap	56	6	1,024	236	231		"Grundpreis"
Subtotal	66	7	1,200	273	227		
Other Primary	2	1	42	56	1,344		
Other in Scrap	6	1	103	28	271		
Subtotal	8	2	145	84	580		
Total	100	100	1,815	4,008	2,208		

Average Sales Price

4,128

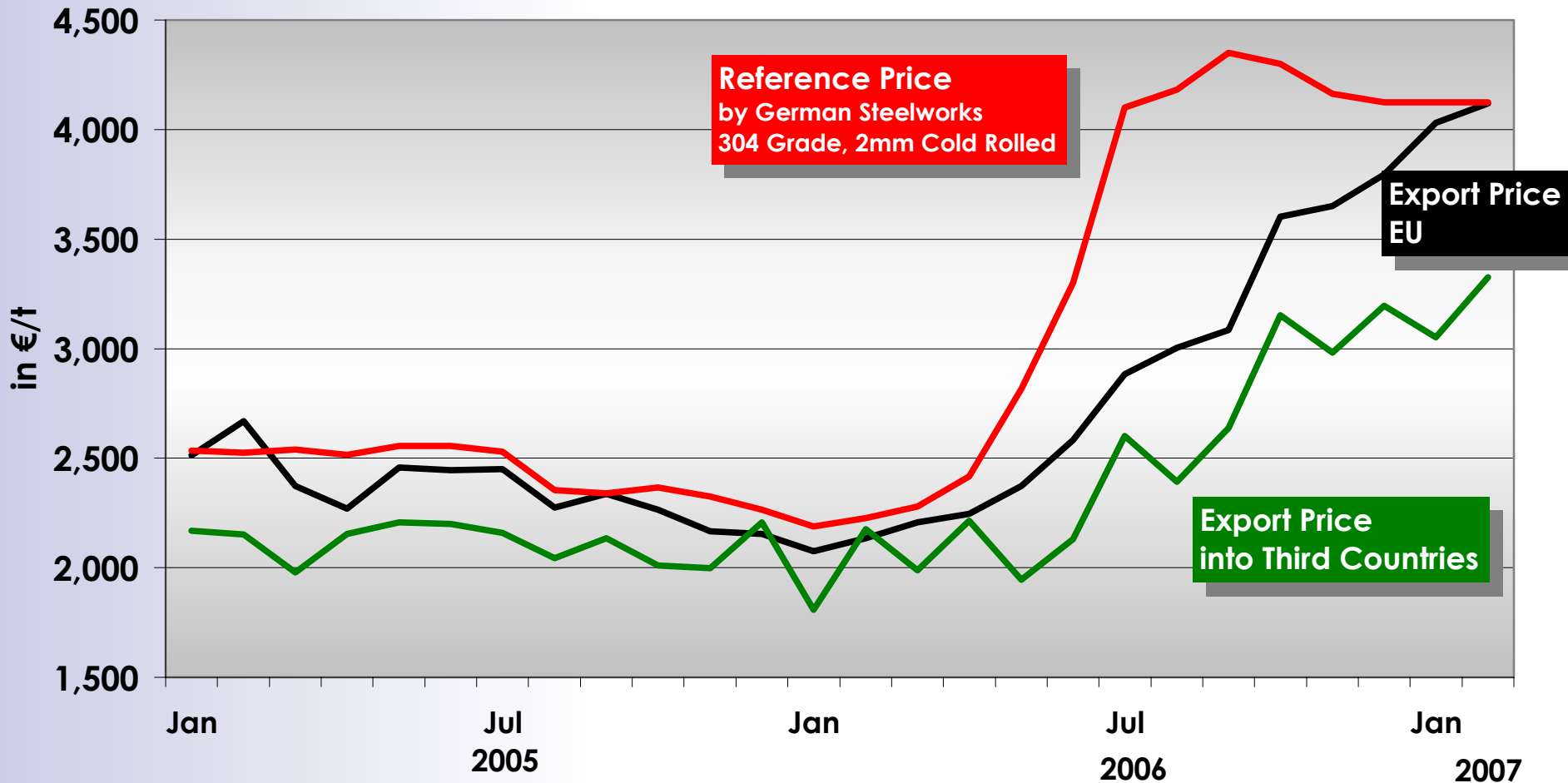
Monthly Alloy Surcharges & LME Nickel Prices

304 Grade, Stainless Steel Flat Products

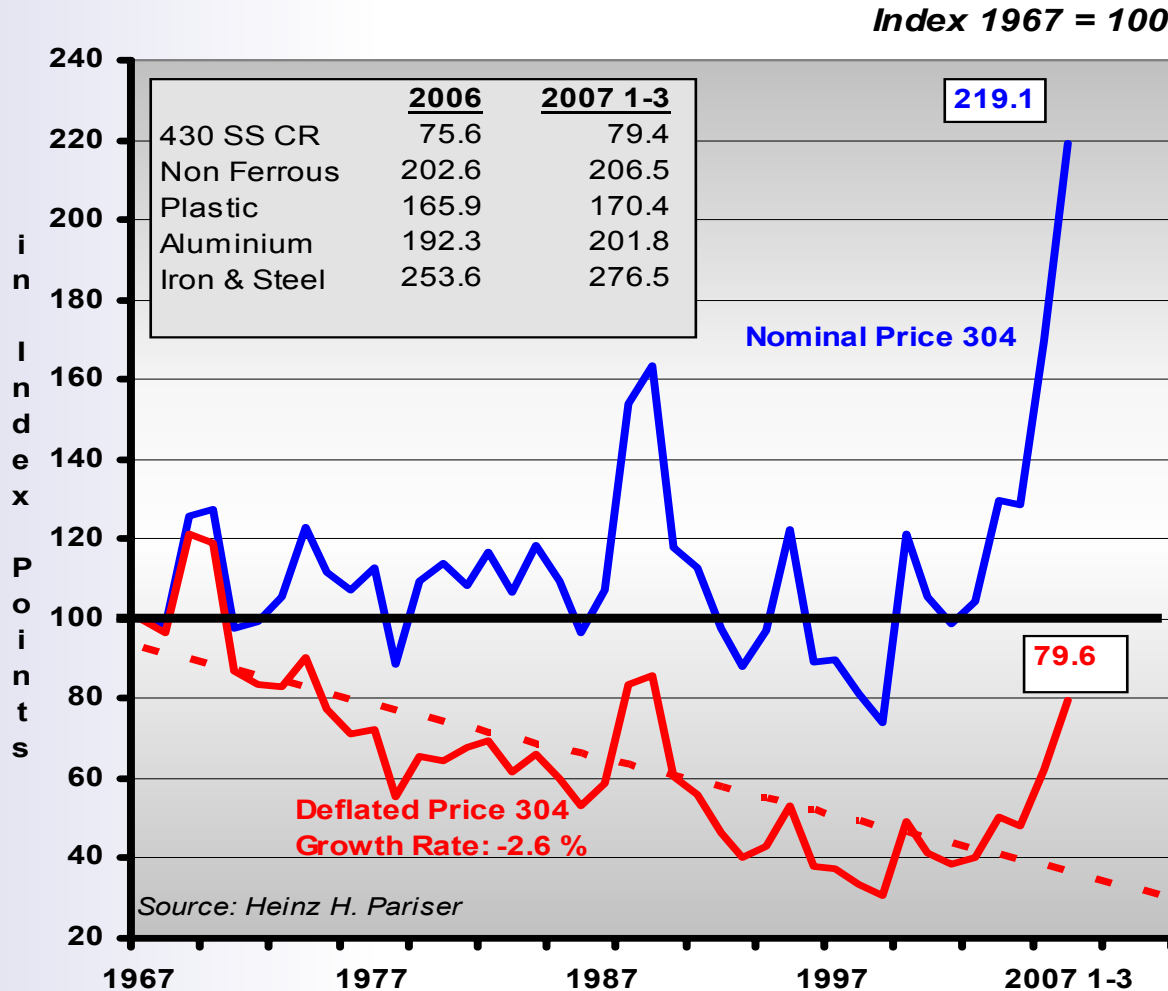


German Stainless Export Price Development

Cold Rolled, 1-3 mm Austenitic

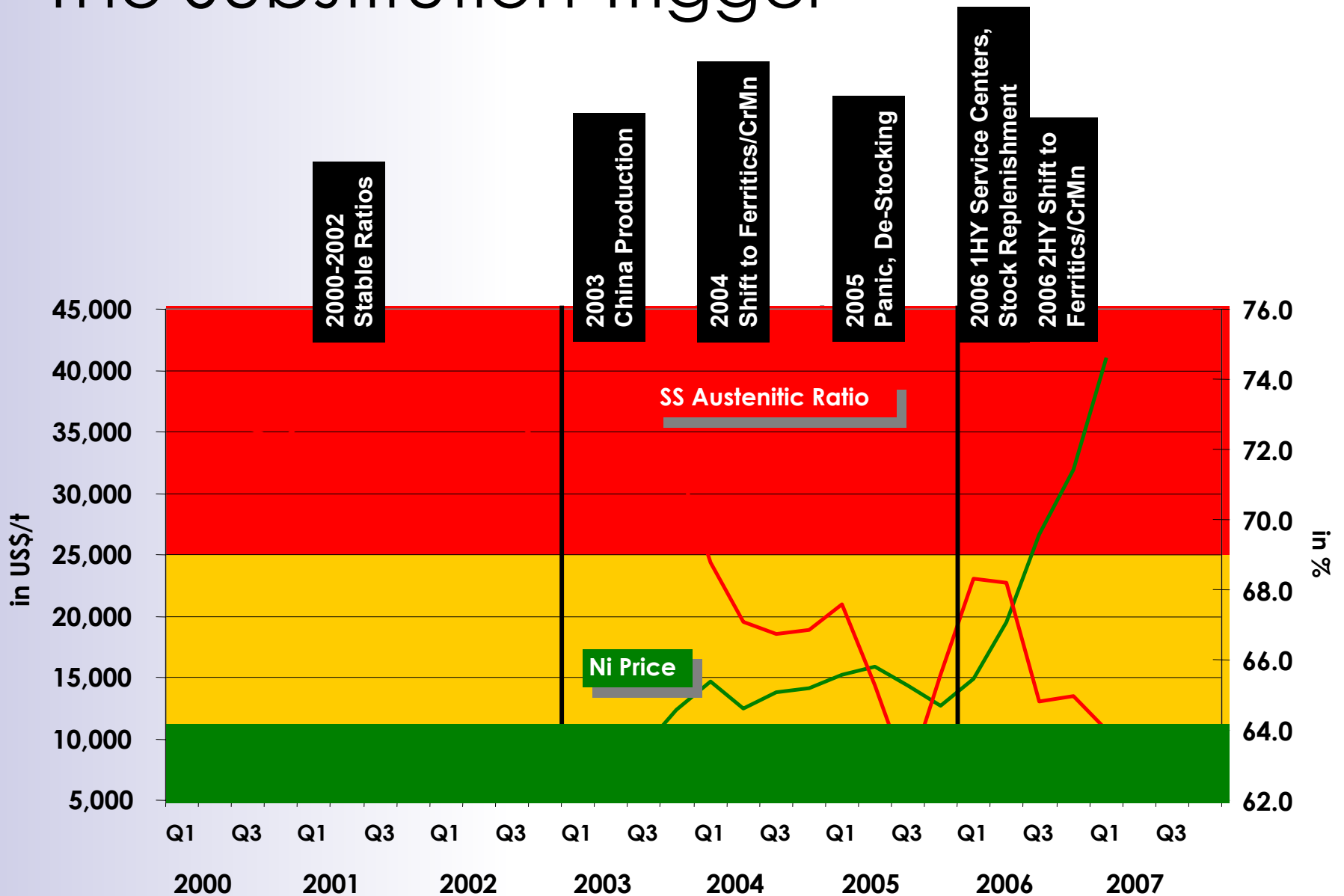


Price Competitiveness of Stainless Steel *)

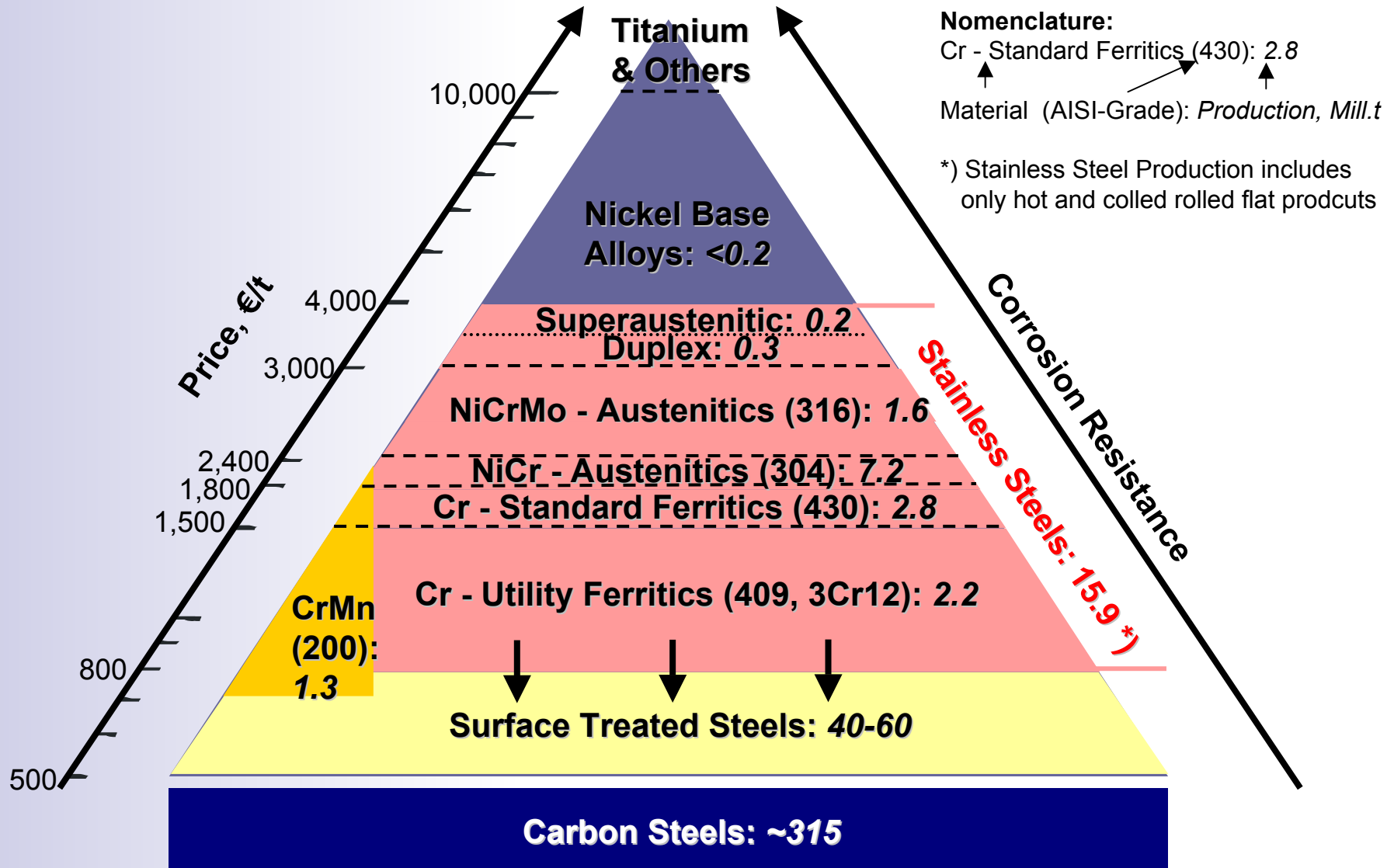


*) Base: Germany

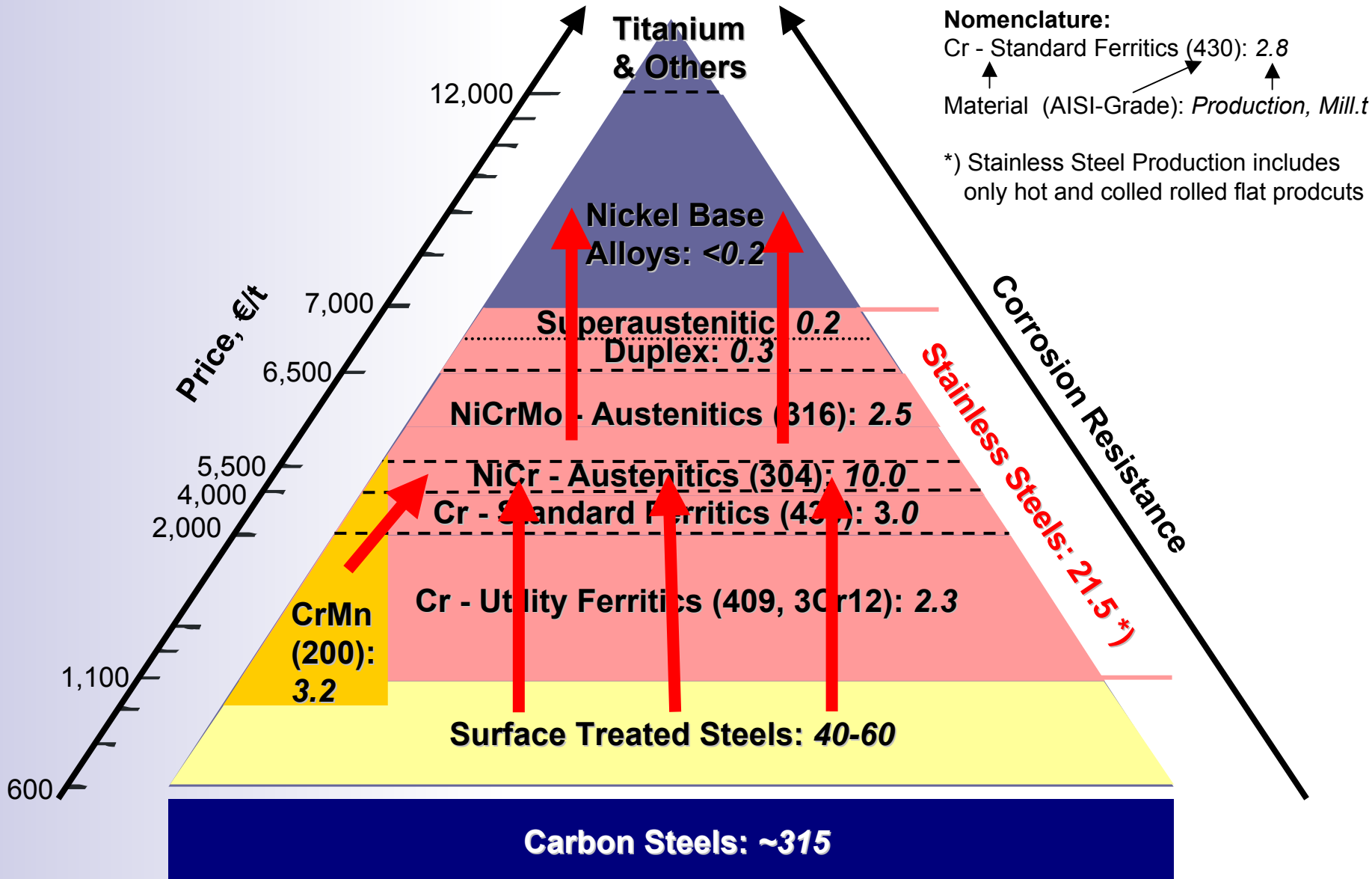
The Substitution Trigger



Traditional Value Added Scheme (2004)



Changing Structures (2007)



Crude Stainless Steel Production

	2005	2006	2007	Change
		in '000 t	(e)	07/06
				in %
America	2,764	2,998	3,104	3.5
European Union	8,316	9,273	8,915	-3.9
Other Europe	204	229	246	7.7
Japan	3,983	4,087	4,280	4.7
China	3,350	5,364	7,350	37.0
Asia	5,502	5,679	5,905	4.0
South Africa	565	690	755	9.5
TOTAL	24,684	28,320	30,555	7.9

Austenitic Ratio of Crude Stainless Steel Production

**Alloy Surcharge
 Systems in Existence**

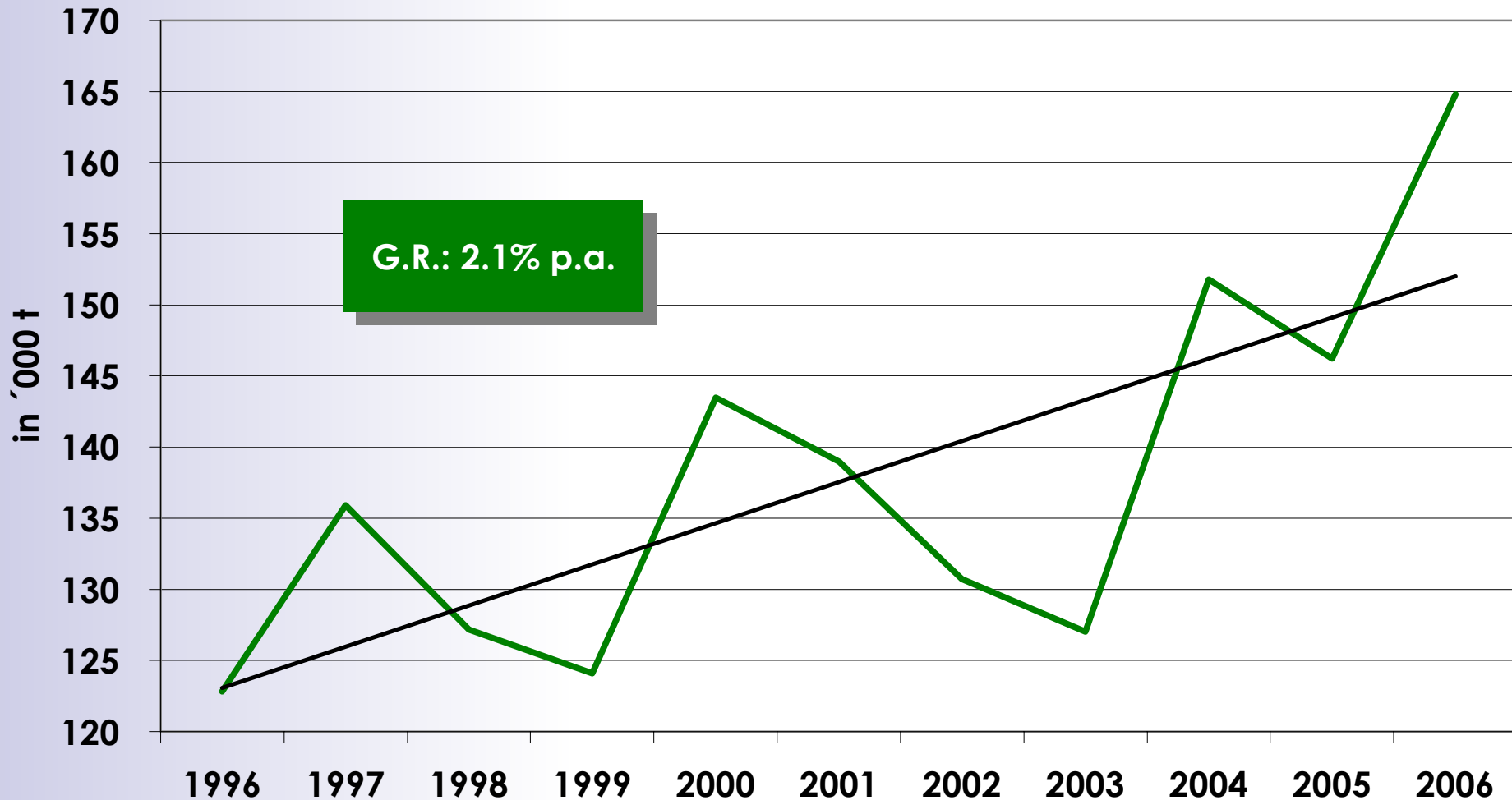
	2004	2005	2006
	in %		
America	63.6	67.1	66.7
EU	80.4	79.9	83.5
Japan	56.2	53.6	49.2
China	64.0	60.0	53.8
S.Korea, Taiwan & India	57.9	55.5	54.7
Others	78.0	54.7	58.5
Total	67.4	65.4	65.9

Changing Product Mix

	Austenitic	CrMn	Ferritic	Total
in Mill t				
2003	16.4	1.4	5.2	23.0
2004	17.0	2.5	5.8	25.3
2005	16.1	2.6	5.9	24.7
2006	18.7	3.1	6.5	28.3
2007e	18.7	3.9	8.0	30.6
in %				
2003	71.4	6.1	22.6	100.0
2004	67.4	9.8	22.9	100.0
2005	65.4	10.7	23.9	100.0
2006	65.9	11.0	23.1	100.0
2007e	61.1	12.7	26.2	100.0

Nickel & Other First Use Segments

First Use of Nickel for Nickel Base Alloys



Nickel Base Alloys

Market Segment	2005 Nickel Requirement in kt	Substitutes	Replacement Potential in kt Ni	Comments
Engineering *)	45	Stainless Steel Rubber, Plastic	10 - 15	Non-Critical Parts only; Design Codes
Electronics	40			
- Shadow Masks		LCD screens	20 - 25	NiFe 36 will be phased out 2010
- Lead Frames		Copper	5 - 10	
Aerospace	44	Ceramics; New Turbine Design	neglectable	not before 2010
Electrical Industry	9	Downgrading	1 - 2	negligible
Automotive & Others	8	NiCrFe Alloys	(+ 2 - 3)	Rising engine temperatures, RPM, & new turbo chargers require Ni Base Alloys in future
TOTAL	146		42.5	

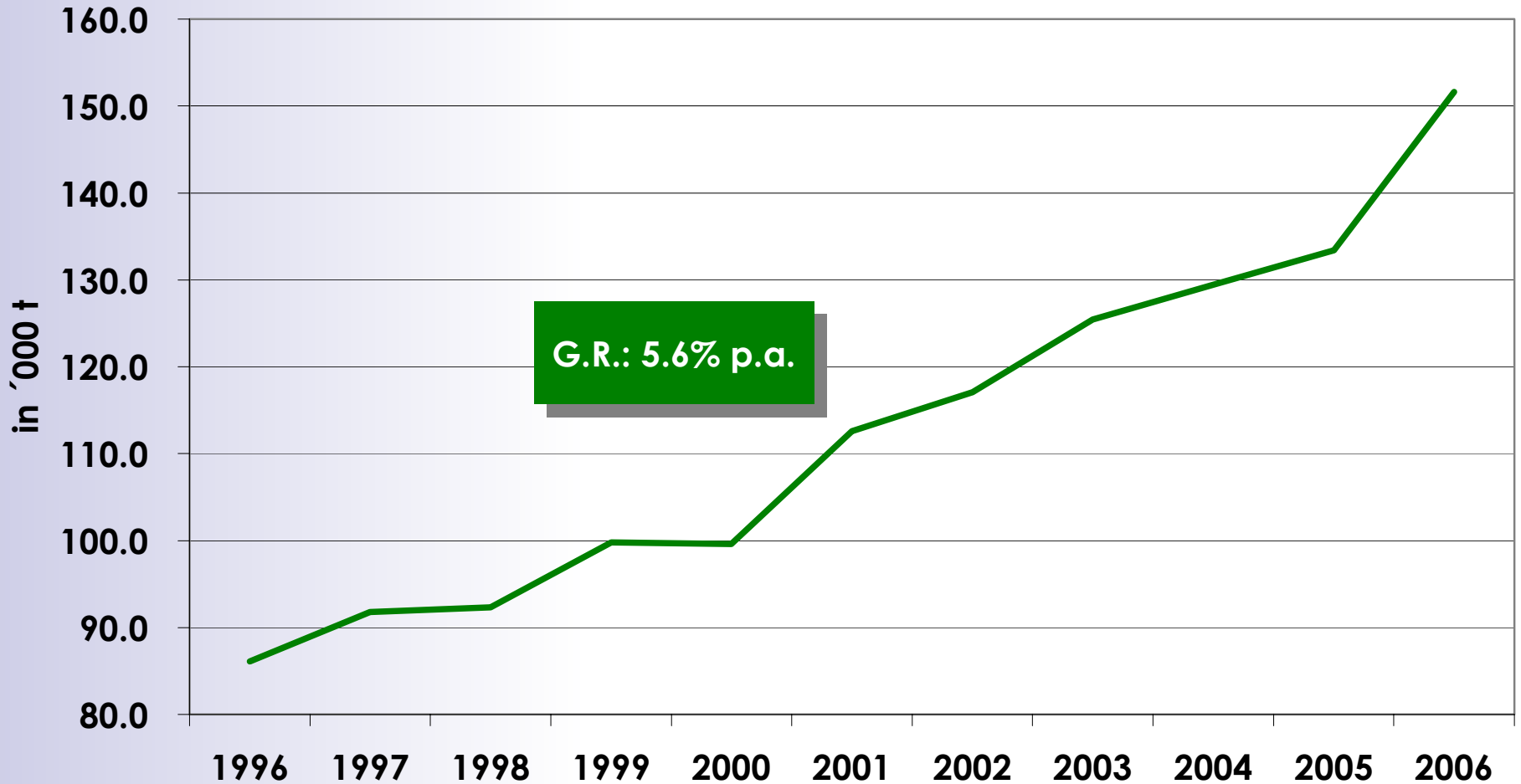
*) Chemical Industry, Flue Gas Scrubbers etc.

Plating

	PLATING	Substitution Potential (10 - 20%)
America	24.9	3.7
European Union	16.6	2.5
Other Europe	10.7	1.6
Japan	4.4	0.7
China	52.0	7.8
Asia	37.8	5.7
Other W. World	5.1	0.8
Total	151.6	22.7

1. During the past decade, nickel usage for plating has been the **fastest growing Nickel application.**
2. Plating is mostly for decorative usage and consequently very price sensitive.
3. Further threats arise from environmental aspects.

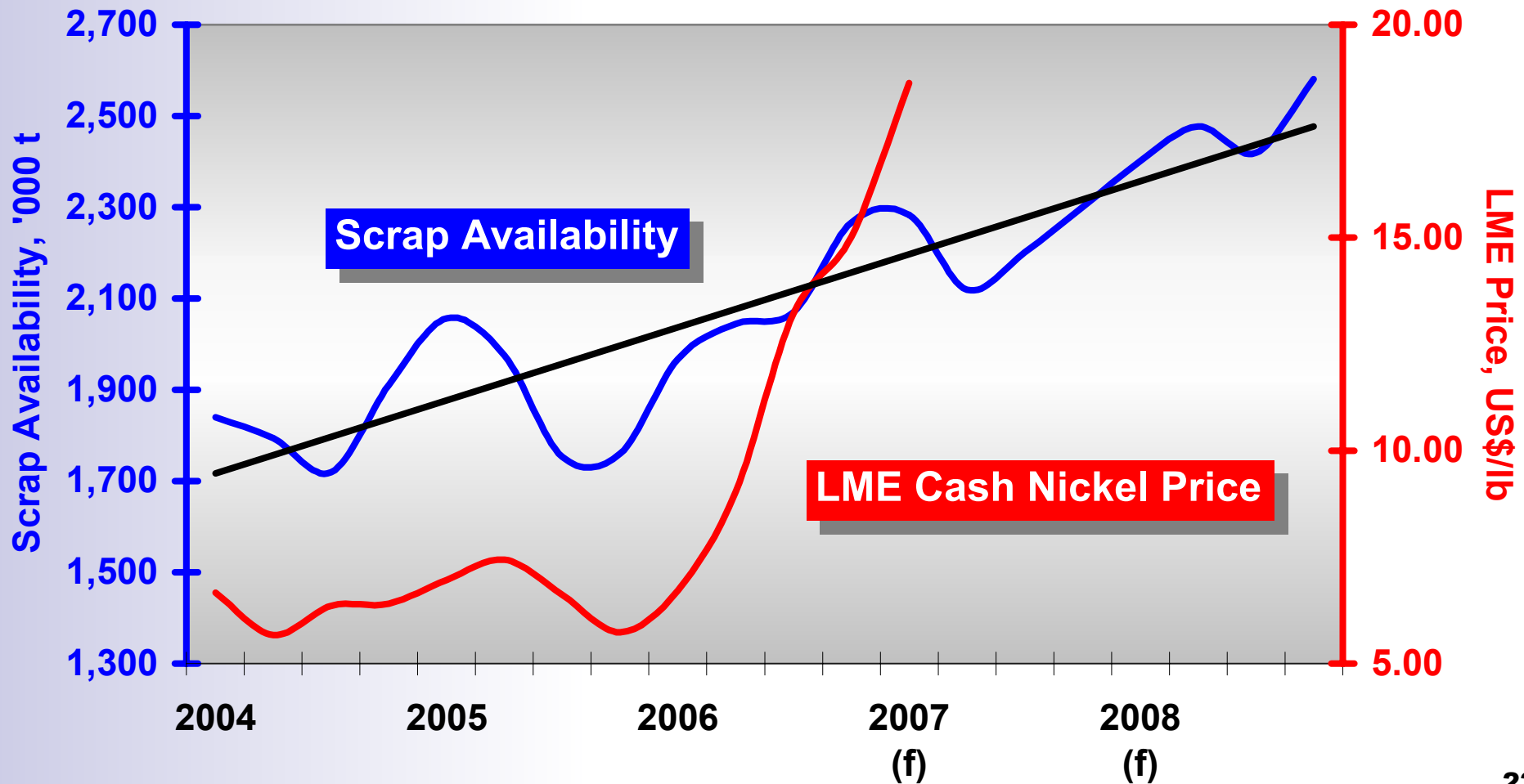
First Use of Nickel for Plating Purposes



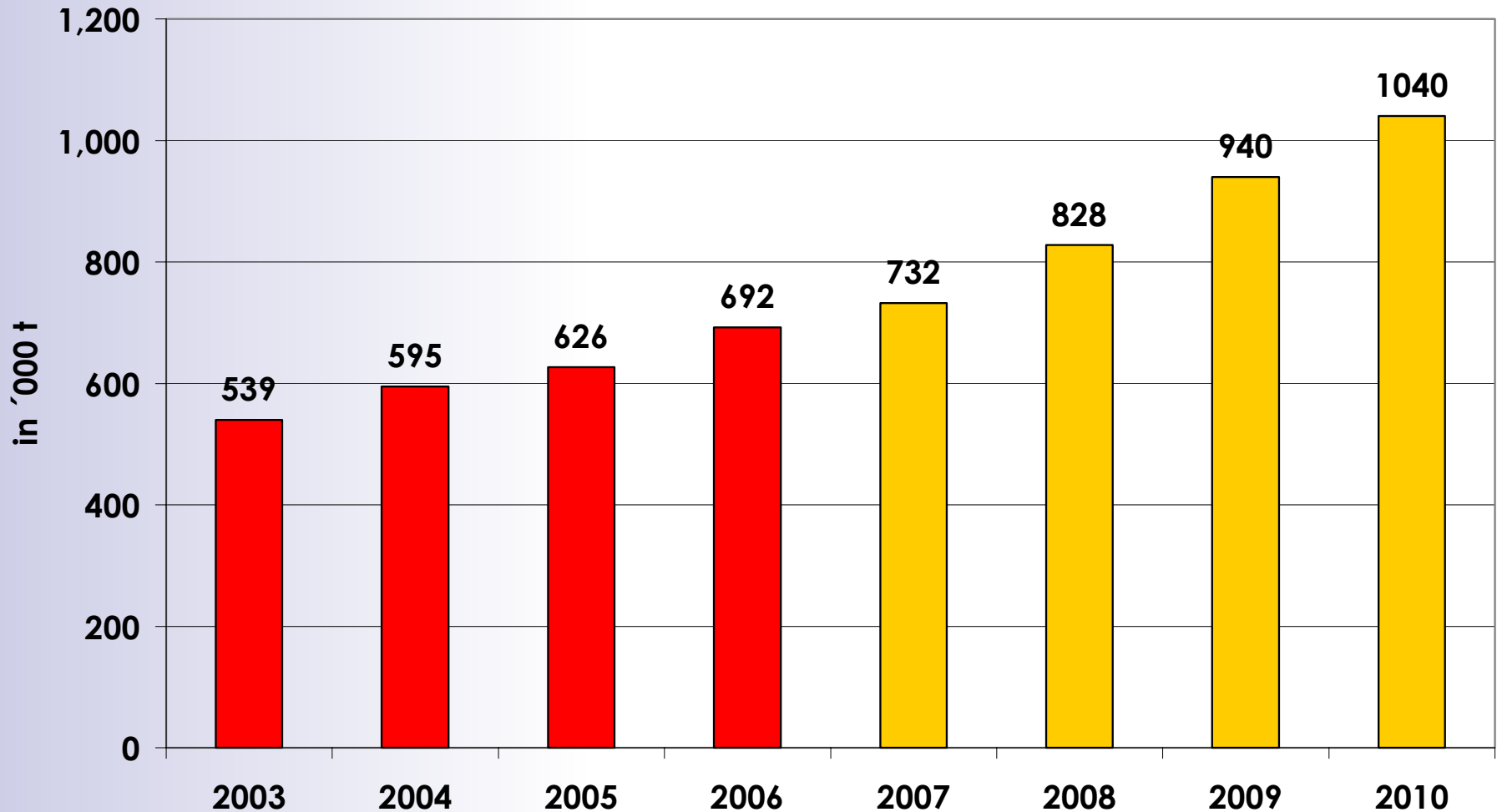
High Nickel Prices are
the Death of High Nickel Prices

World Scrap Availability vs. LME Ni Price

Source: Heinz H. Pariser



Nickel Units from External Stainless Scrap



Primary & Secondary Nickel Market

	Primary	Secondary	Total	Change
	in '000 t Ni Content			in %
2003	1,192	539	1,731	0.2
2004	1,250	595	1,845	6.6
2005	1,293	626	1,919	4.0
2006	1,349	692	2,041	6.3
2007	1,390	732	2,122	4.0
Growth Rate in % p.a.	3.9	7.9	5.2	

Backward Integration of Stainless Industry

Company	Project	Comments	kt	Start Up
1. Posco	Ferro Nickel	Conversion of Imported Ore from New Caledonia	30	2008
2. China MMC	Ramu Nickel	HPAL Process Papua New Guinea	30	2008/9
3. China	NiCr Pig Iron	Various Blast Furnace Operations	70	in progress
4. Cuba	Las Camariocas	Completion / Expansion	50	2009/10
5. Japan/S.Korea	Ambatovy	Madagascar	60	2009/10
Total			240	

Capacity Changes by Nickel Industry

(in '000 t)

Existing Capacity 2006		1,512
Actual Supply		1,350
Capacity Utilisation in %		89.3
Major Capacity Expansions until 2010		
Under Construction	- BHP Billiton	45
	- CVRD / Inco	163
	- SMM Philippines	10
	- European Nickel	21
	Subtotal	239
Probable Capacity Expansions until 2012		
	- Inco Voisey's Bay (II)	50
	- Xstrata Koniambo	60
	Subtotal	110
Possible Capacity Expansions		
	- Lateritic	453
	- Sulphidic	32
	Subtotal	485
Total Capacity		
	2010	1,751
	2012	1,861
	Beyond 2012	2,346

The Nickel Bull Trap !?

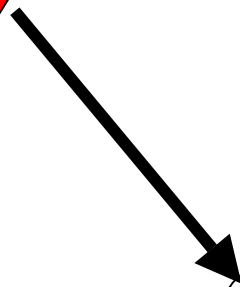
	2006	Expansions (2007 - 2010) in '000 t	2010
1. Primary Nickel			
- Capacity			
- Nickel Companies	1,578	240	1,818
- Backward Projects	-	240	180
Total Capacity	1,578	480	1,998
- Production	1,349		1,740
- Capacity Utilisation in %	85.5		87.1
2. Nickel in Scrap	693	347	1,040
3. Total Nickel Supply	2,042		2,780
4. Primary & Secondary Nickel Consumption (4% p.a. Growth)	2,081		2,430
5. Balance	-39		350

Cui Bono ?

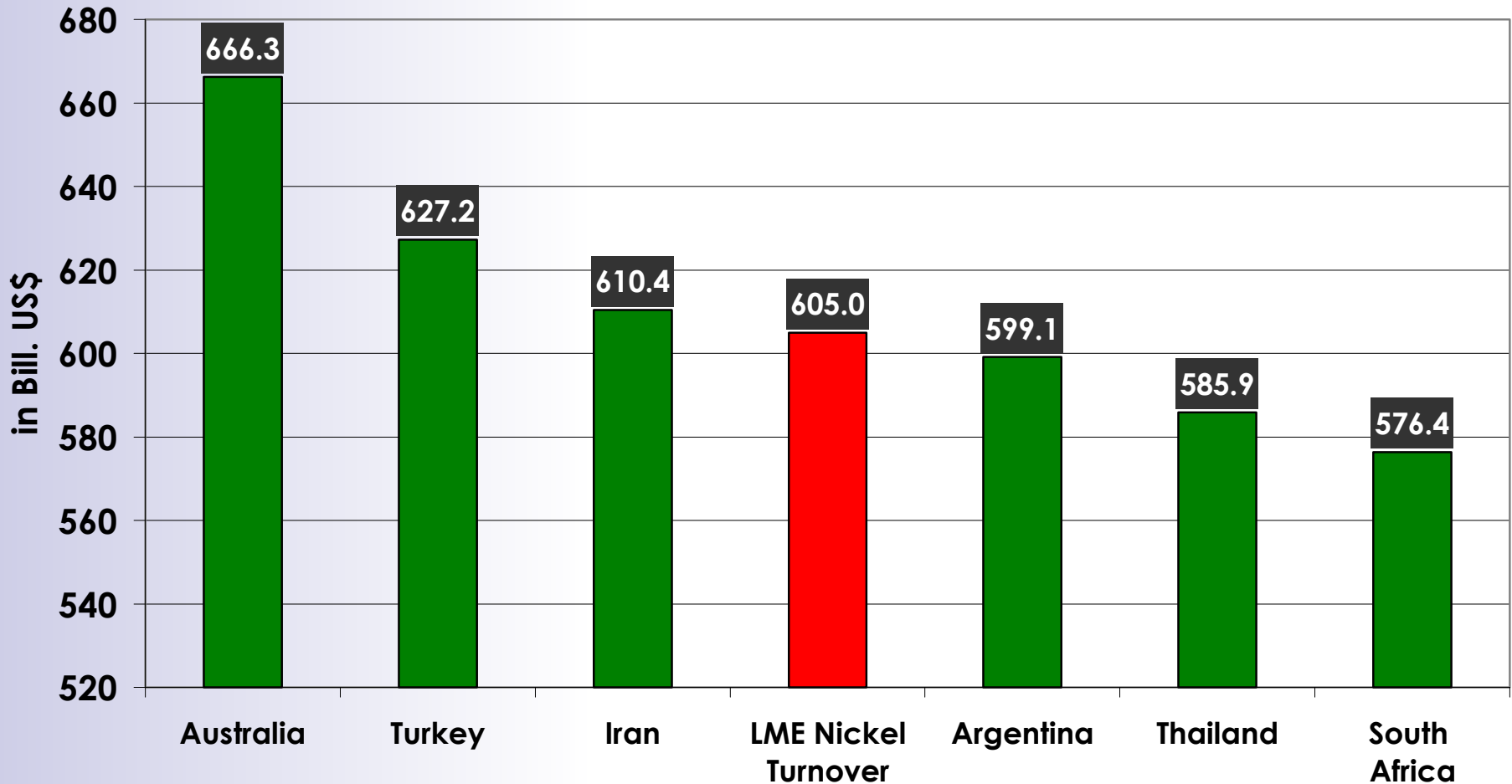
LME vs. Fundamental Market

	2006	2005	2004	2003
Market ('000)				
Nickel Consumption	1,385	1,245	1,252	1,228
LME Turnover	26,016	24,086	19,783	26,366
Multiple	18.8	19.3	15.8	21.5
Value (US\$)				
Consumption	22.0	19.8	17.3	11.8
LME Turnover	605.0	382.5	273.6	253.3
Physical Market ('000 t)				
Deliveries ex LME Warehouses	86	43	49	57
Ratio of World Consumption (%)	6.2	3.4	3.9	4.6
Inventories (End of Period)	6.6	36.0	20.9	24.1

Hedging: 110 Bill \$
 Institutional Investors: 495 Bil



LME Nickel Turnover vs. GDP of Selected Countries



Conclusion

- 1. 2006 / 2007 Nickel & Stainless prices attract substitution.**
- 2. More and more Nickel – free / Low Ni alternatives are developed in the Stainless Steel and Steel industry.**
- 3. Substitution can also be expected:**
 - in Nickel-base Alloys (general engineering and electronics);**
 - high risk in Plating Nickel**
- 4. Over 0.8 Mill t additional Nickel units become available by 2010 from stainless scrap and new nickel operations.**
- 5. Nickel Overcapacity by 2010???**

Nickel Price Explosion:

A Few Months of Fun –

Many Years of Sorrow!



Thank you for your attention !!